

Indian Standard

(Reaffirmed 2012)

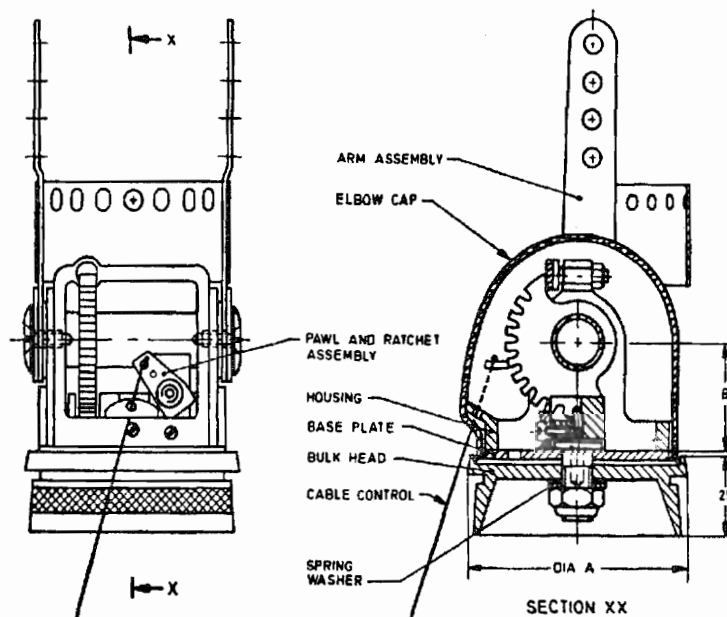
SPECIFICATION FOR MECHANICAL ELBOW JOINT

(First Revision)

(Reaffirmed 2017)

1. Scope — Covers the general requirements of mechanically operated internal elbow joint applicable for standard above elbow prosthetic fittings

2. Shape and Dimensions — As shown in Fig. 1.



Size	Dia A	B
1	62	31.5
2	74	33.0
3	80	33.0

All dimensions in millimetres

FIG 1 ELBOW JOINT MECHANICAL

2.1 The size of the elbow is decided by outer diameter of the bulk head (turn-table)

3. Material — Materials used for different components shall be such as to meet the desired functionalability of the components. Typical materials are given below, however materials having better properties may also be used for the purpose.

- Bulk head — Aluminium alloy of designation HE 30 WP of IS 733-1975 'Specification for wrought aluminium and aluminium alloy bars rods and sections (for general engineering purposes) (second revision)'
- Main housing — Aluminium alloy castings as per IS : 617-1975 'Specification for aluminium and aluminium alloys ingots and castings for general engineering purposes (second revision)'.

Adopted IS June 1983

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- c) Brackets — Aluminium alloy of designation HE 30 WP of IS : 733-1975.
- d) Ratchet, pawl, pawlhousing lever and gear sector — Carbon steel conforming to designation C 30 of IS 1570-1961 'Schedules for wrought steels for general engineering purposes '
- e) Springs — Springs steel conforming to grade SW of IS . 4454 (Part II)-1975 ' Specification for oil hardened and tempered spring steel wire and valve spring wire-unalloyed (*first revision*) '
- f) Base plate — Aluminium alloy sheet of designation HS 30 WP of IS : 737-1974 'Specification for wrought aluminium and aluminium alloys sheet and strip (for general engineering purposes) (*second revision*) '
- g) Arm assembly — Mild steel sheet conforming to grade 0 of IS : 513-1975 ' Specification for cold rolled carbon steel sheets (*second revision*) '
- h) Elbow cap — Plastic sheet moulded, vacuum formed or resin laminated.

4. Construction

- 4.1 An attachment to the humeral socket on the proximal side by a detachable bulk head shall be provided
- 4.2 An attachment to the forearm section on the distal side by a detachable arm assembly shall be provided
- 4.3 The function of movement of flexion and extension (5 to 135°) at the joint axis (the initial flexion shall be adjustable through a positive stop) with the provision of positive locking and unlocking at minimum ten intermittent steps through a cable control system shall be provided The maximum cable pull required shall not be more than 15 mm
- 4.4 The function of movement of rotation (0 to 360°) around the axis of the arm with the provision of friction lock for passive operation, shall be provided

5. Workmanship and Finish

- 5.1 All machined components shall have smooth and good finish and shall be free from any machining flaws
- 5.2 All aluminium components shall be anodised after machining to grade AC-10 of IS : 1868-1968 'Specification for anodic coatings on aluminium (*first revision*) '
- 5.3 Mild steel components shall be buffed smooth after machining and plated either dull nickel or chromium over nickel in accordance with service grade 2 of IS 1068-1968 'Specification for electroplated coatings of nickel and chromium on iron and steel (*first revision*) ' The components may also be zinc plated in accordance with IS 1573 1970 ' Electroplated coatings of zinc on iron and steel '
- 5.4 All moving mating surfaces shall be ground or reamed
- 5.5 In the locked condition there shall not be any relative motion between bulk head (arm section) and fore-arm assembly (fore-arm section)

6. Tests

- 6.1 *Load Test* — In the locked condition or at any intermediate flexed condition of elbow, the unit shall be capable of withstanding a vertical load of minimum 30 kg, when applied at a distance of 300 mm of arm length The procedure to carry out this test and values for various sizes are given in Appendix A.
- 6.2 *Cyclic Test* — The complete assembled elbow unit shall be tested for one lakh number of cycles of its locking and unlocking operation (without load). The mechanism shall withstand this test without any mechanical failure The procedure for carrying out this test is given in Appendix B

7. Marking — The elbow joint shall be marked with the following

- a) Manufacturer's name or initials or recognized trade-mark, and
- b) The words ' Right hand ' or ' Left hand '

7.1 *ISI Certification Marking* — Details available with the Indian Standards Institution

8. Packing — As agreed to between the purchaser and the supplier

AMENDMENT NO. 1 MARCH 1993
TO
IS 5603 : 1983 SPECIFICATION FOR MECHANICAL
ELBOW JOINT

(First Revision)

(Page 1, clause 3, line 2) — Insert the word 'alternate' between the words 'however' and 'materials'

(Page 2, clause 6.1, line 2) — Substitute 'maximum 10 kg' for 'minimum 30 kg'

[Page 3, clause A-1 1(c)] — Substitute '5 to 10 kg in interval of 1 kg' for '5 to 40 kg in interval of 5 kg'

(Page 3, clause A-2.1, line 1) — Substitute '1 kg' for '5 kg'

(Page 3, clause A-2 1, line 3) — Substitute '10 kg' for '30 kg'

(MHD 10)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 SEPTEMBER 1994
TO
IS 5603 : 1983 SPECIFICATION FOR MECHANICAL
ELBOW JOINT

(First Revision)

(Page 1, Fig: 1, informal table) — Incorporate a tolerance of ' ± 2 mm' on 'Dia A' and ' ± 1 mm' on dimension 'B'

(MHD 10)

Reprography Unit, BIS, New Delhi, India

APPENDIX A

(Clause 6.1)

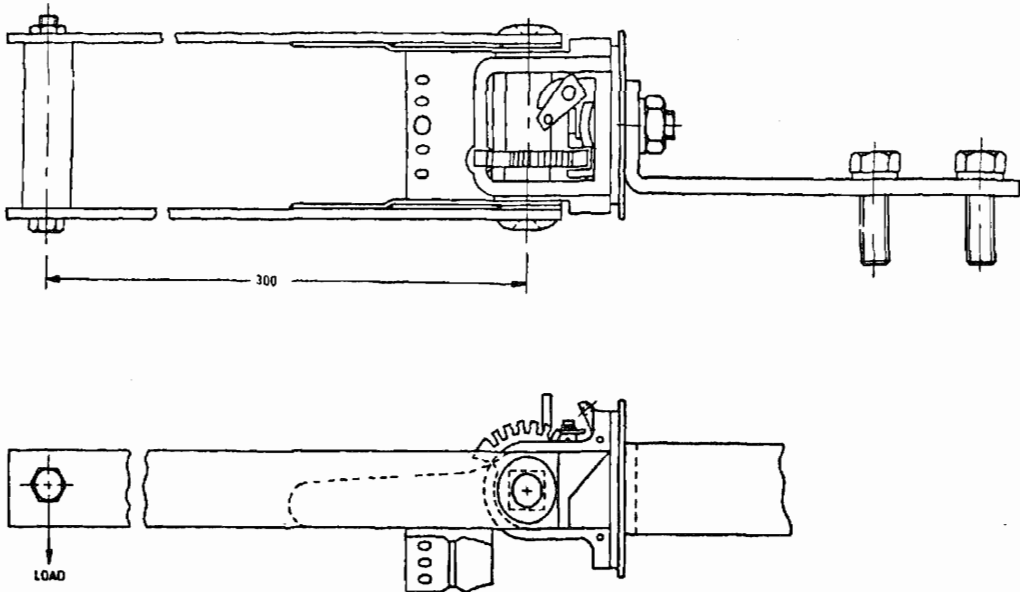
LOAD TEST**A-0. GENERAL**

A-0.1 Load Test— The elbow unit is subjected to a vertical load when an object is carried by terminal device in any intermediate flexed and locked condition.

A-1. APPARATUS

A-1.1 The apparatus as shown in Fig. 2 shall consists of the following:

- Elbow unit with Its cap and arm assembly removed,
- A special arm assembly with side bars extended to an ideal arm length (300 mm approx) with provision for suspension of loads, and
- Weights (in combination shall provide loads of 5 to 40 kg in Interval of 5 kg).



All dimensions in millimetres

FIG. 2 LOAD TEST ARRANGEMENT FOR MECHANICAL ELBOW JOINT**A-2. PROCEDURE**

A-2.1 After setting up the apparatus as shown in Fig 2 the loads are applied in interval of 5 kg After every application of load the load is taken up by 15 mm (approx) and then allowed to fall to produce Impact effect. in the above manner at least 30 kg of load shall be borne by gear tooth without any failure.

APPENDIX B

(Clause 6.2)

CYCLIC TEST

B-0. GENERAL

B-0.1 Cyclic Test — The purpose of this test is to ensure trouble free working of mechanism which is based on coil spring for a certain span of life.

B-1. APPARATUS

B-1.1 The apparatus as shown in Fig. 3 shall consists of the following:

- Elbow unit without its cap,
- A motor with gear reduction train, and
- An eccentric to provide to and fro throw of 15 mm required for operating the mechanism.

B.2. PRINCIPLE

$$T = \frac{3\,333}{N}$$

where

T = time in hours for one lakh cycles, and

N = rpm (revolution per minute) available at eccentric after gear reduction.

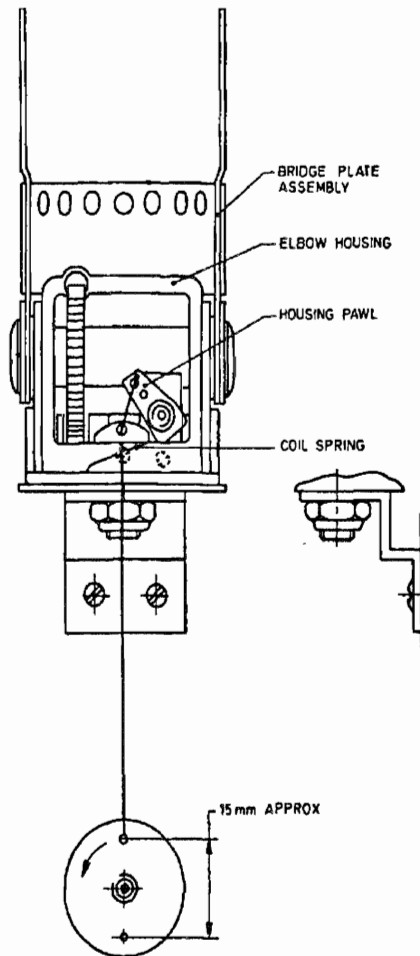


FIG. 3 CYCLE TEST ARRANGEMENT FOR ELBOW JOINT

B-3. PROCEDURE

B.3.1 After getting the apparatus ready for the test as shown in Fig. 3 the motor is switched on and time is noted down. The test is continued for a specified period (based on rpm of motor and gear reduction train). During the test period and just at the end of the test the spring shall function without any failure in shape and dimensions. The number of cycles to be run for test are one lakh.

EXPLANATORY NOTE

This standard was first published in 1970. At that time the draft was prepared at the Artificial Limb Centre, Pune. However with the development of new design at Artificial Limbs Manufacturing Corporation (ALIMCO), Kanpur, this revised standard incorporates, the new design, functional features, and performance oriented tests.